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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,961	09/15/2006	Tomoyuki Watanabe	ASAIN0189	2626

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EXAMINER	
MULPURI, SAVITRI	
ART UNIT	PAPER NUMBER
2812	

MAIL DATE	DELIVERY MODE
03/10/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,961	WATANABE ET AL.	
	Examiner	Art Unit	
	Savitri Mulpuri	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/15/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-2, 5-7, 9, 10 are rejected under 35 U.S.C. 102(a) as being anticipated by Wieczorek et al (US 2004/0018696).

With respect to claim 1 Wieczorek et al teach a method of manufacturing a semiconductor device comprising: a first film forming step of forming, on a concave and convex portion formed by an element on a semiconductor substrate (fig. 2a, para 0032), an oxidation preventive layer **as a thin non-oxidizable layer (not shown)** ,which prevents permeation of moisture into the element(para 0033, lines 10-13) ;a second film forming step of forming, on the oxidation preventive layer, an expansion layer '220" which can be oxidized and expanded by a heat treatment in an oxidation atmosphere; a third film forming step of forming, on the expansion layer, an insulating film ""206" which can be fluidized by the heat treatment in the oxidation atmosphere; and an expansion step of subjecting, to the heat treatment in the oxidation atmosphere, the semiconductor substrate on which the oxidation preventive layer, the expansion layer and the insulating film have been formed, to fluidize the insulating film and to oxidize and expand the

expansion layer, thereby eliminating bubbles generated in the insulating film.(2a- 2d and related description, para 0032-0038)

With respect to claim 7 Wieczorek et al teach a method for manufacturing semiconductor device, comprising: a first film forming step of forming, on a concave and convex portion formed by an element on a semiconductor substrate, an oxidation preventive layer which prevents permeation of moisture into the element; a second film forming step of forming, on the oxidation preventive layer **as a thin non-oxidizable layer (not shown)** , an expansion flow layer which can be oxidized, expanded and fluidized by a heat treatment in an oxidation atmosphere and which has an insulating property; and an expansion step of subjecting, to the heat treatment in the oxidation atmosphere, the semiconductor substrate on which the oxidation preventive layer and the expansion flow layer have been formed, to oxidize, expand and fluidize the expansion flow layer, thereby eliminating bubbles or open pores generated in the expansion flow layer (2a-2d and related deception).

With respect to claim 5 and claim 9 Wiecaorek et al teach the oxidation preventive layer (not shown) is formed of a silicon nitride film.

With respect to claim 6 and claim 10 Wiecarek et al implicitly teach a pressure of the oxidation atmosphere in the expansion step is atmospheric pressure or more, and Wiecarek et al explicitly teach a temperature of the heat treatment is 400.degree. C. to

800.degree. C. (claim 26 and claim 43). Inherently Wiecarek et al teach pressure for oxidation is atmospheric pressure because Wieczorek et al does not mention any thing about using chamber or furnace for enclosing the substrate in controlled atmosphere to oxidize silicon layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wieczorek et al in combination with Ishitsuka et al (US 6,881,646) and admitted prior art.

With respect to claim 2 and claim 8 Wiecaorek et al teach the expansion layer, as in claim 1 or expansion flow layer as in claim 4 which is made of silicon (para 0033, lines 1-3), but do not mention silicon is one of polycrystalline silicon or amorphous silicon.. Ishtsuka et al teach amorphous or polysilicon or monocrystalline silicon and oxidizing the polysilicon to avoid any void formation (col.2, lines 2146). It would have been obvious to one of ordinary skill in the art to use amorphous or polysilicon for oxidation in place of silicon in place of silicon in the invention of Wieczorek et al because Ishitsuka et al because any type silicon is functionally equivalent to remove voids.

With respect to claim 4 Wieczorek et al do not teach the insulating film is a silicon oxide film containing at least one of phosphorus, arsenic, boron, fluorine and a halide. Admitted prior art teach insulator layer is BPSG layer (page 3, line 16-27). It would have been obvious to one of ordinary skill in the art that to use BPSG layer because reflow of BSG is excellent and would avoid formation of voids.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wieczorek et al in combination with Manir et al (5652176)

Wieczorek et al do not teach the expansion layer is made of aluminum, tantalum or an alloy of them. Manir et al teaches forming aluminum oxide as alternative to silicon oxide for isolation in thee trench (col. 4, lines 26-243). It would have been obvious to one of ordinary skill in the art to use aluminum oxide as alternative to silicon because both are functionally equivalent to form device isolation regions as mentioned by Manir et al

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art teach a method o manufacturing a semiconductor device by forming trenches.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Savitri Mulpuri whose telephone number is 571-272-1677. The examiner can normally be reached on Mon-Fr from 8 a.m. to 4.3-0 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber, can be reached on 571-272-2194. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Savitri Mulpuri/
Primary Examiner, Art Unit 2812